

NEW SPECIES OF THE GENUS *KELLIA* (BIVALVIA: KELLIIDAE)
FROM THE COMMANDER ISLANDS,
WITH NOTES ON *KELLIA COMANDORICA* SCARLATO, 1981

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ABSTRACT

A new species, *Kellia kussakini*, is described from the Commander Islands. This species has a small (to 4.8 mm), translucent, pear-shaped, very inflated, almost globular shell (shell length, height, and width almost equal), with a slightly polished, yellowish-gray periostracum and posteriorly placed beaks. It was found in the subtidal zone (depth 5–20 m) of Bering and Medny islands, on a rocky platform, with population density to 1,190 specimens/m². Scarlato (1981) described *Kellia comandorica* Scarlato, 1981, from the Commander Islands after study of a small amount of material (10 specimens). Later, Coan et al. (2000) synonymized *K. comandorica* with *K. suborbicularis* (Montagu, 1803). A study of extensive material (146 specimens) has shown that *K. comandorica* is a separate species having characters that distinguish it from other species of *Kellia*. An expanded description of *K. comandorica* is given.

Key words: *Kellia*, Kelliidae, Bivalvia, Commander Islands, morphology, distribution.

INTRODUCTION

The bivalve mollusk fauna of the Commander Islands shelf has been poorly studied. The most complete species list of bivalve mollusks of the Commander Islands was published after examination of the extensive material collected by two joint expeditions of IMB-PRIFO (the sealer “Krylatka”, 1972; RV “Rakitnoye”, 1973) to these islands, as well as an analysis of previous investigations (Kamenev, 1995). However, there still were a number species requiring additional investigation and more accurate identification. Subsequently, a few papers devoted to the study of these species were published (Kamenev, 1996, 2002; Kamenev & Nadochay, 2000). Further examination of bivalve mollusks collected in the shelf zone of the Commander Islands revealed one new species of the genus *Kellia* which was erroneously identified as *Kellia suborbicularis* (Montagu, 1803) (Kamenev, 1995). In addition, another species of this genus, *Kellia comandorica* Scarlato, 1981, described by Scarlato (1981) based on a small amount of material, is abundant in the intertidal and subtidal zones of the Commander Islands. Scarlato (1981) described *K.*

comandorica in detail and provided a comparative diagnosis with distinguishing characters of this species, and photos of the holotype. Coan et al. (2000) considered this species as a synonym of *K. suborbicularis*. A study of a large quantity of *K. comandorica*, which is a common mollusk in the Commander Islands, has clearly shown that it is a well-identifiable, separate species of *Kellia*. The goal of this paper is to describe the new species and expand the description of *K. comandorica*, with new data on its morphology, ecology, and geographical distribution.

MATERIAL AND METHODS

In this study I used the material collected by the joint expeditions of IMB-PRIFO in the subtidal zone of the Kuril Islands (the sealer “Krylatka”, September–October 1969) and Commander Islands (the sealer “Krylatka”, July 1972; RV “Rakitnoe”, August–October 1973) and the expedition of IMB in the intertidal zone of the Commander Islands (June–August 1972). The material of the new species and of *K. comandorica* from the subtidal zone of the Commander Islands was fixed and stored in 70% ethanol in IMB. Material of *K.*

comandorica from the Kuril Islands and the intertidal zone of the Commander Islands was fixed in 70% ethanol and stored dry in IMB.

For comparison purposes, collections of *K. suborbicularis* – 88 specimens from the North Atlantic (CAS, NHM, NMW) and more 300 specimens from the northeastern Pacific (CAS, UW); of *Kellia japonica* Pilsbry, 1895 – 2 specimens from Japan (NSMT Mo 73530) and 16 specimens from the Pacific seas of Russia (MIMB); of *Kellia porculus* Pilsbry, 1904 – 1 specimen from Japan (NSMT Mo 73531); and of *Kellia subrotundata* (Dunker, 1882) – 1 specimen from (NSMT Mo 73532) were used. All material of these species was stored dry.

Shell Measurements

Figure 1 shows the shell morphology measurements. Shell length (L), anterior end length (A), height (H), width (W) (not shown) were measured for each valve. The ratios of these parameters to shell length (A/L, H/L, W/L, respectively) were determined. Shell measurements were made using a caliper and an ocular micrometer with an accuracy of 0.1 mm.

The following material was measured:

- (1) 85 specimens, 1 right and 5 left valves of *K. comandorica* from Urup Island, Kuril Islands, (MIMB, 15 specimens, 1 right, 5 left valves) and the Commander Islands (MIMB, IMB, 70 specimens).
- (2) 97 specimens of the new species from the Commander Islands (IMB).
- (3) 44 specimens of *K. suborbicularis* from the North Atlantic: Weymouth, Dorset, Sea area 16, United Kingdom (NMW 1953.183, 24 specimens); Tenby, Pembrokeshire, Sea area 21, United Kingdom (NMW 1953.183, 9 specimens); Guernsey, Channel Is., Sea area 17, United Kingdom (NMW 1953.183, 3 specimens); Plymouth, United Kingdom (NHM 20030382, 2 specimens); Isle of Herm, Guernsey, United Kingdom (NHM 20030383, 2 specimens); England (CAS 165845, 2 specimens); England (CAS 165846, 2 specimens).
- (4) 21 specimens of *K. suborbicularis* from the northeastern Pacific: Monterey Bay, California (CAS 161254, 8 specimens); Orcas Island, San Juan Islands, San Juan County, Puget Sound, Washington (CAS 161256, 7 specimens); Alaska (CAS 161255, 6 specimens).

Statistics

Statistical analysis of the material used a package of statistical programs STATISTICA (Borovikov & Borovikov, 1997) and Data Analysis Module of MS Excel 97.

The calculated indices (A/L; H/L; W/L) are less susceptible to change compared with other measured parameters. Therefore, the statistical analysis was performed using only these characteristics. All data was tested with a Kolmogorov test for their fit to a normal distribution. The distribution of some indices was different from the norm. Therefore all analyses were performed on \log_{10} transformations of the original variables. All indices for pairs of different valves of *Kellia* species were compared using the Student (T) parametric test and one-way analysis of variance (ANOVA).

Throughout this study, statistical significance was defined as $P < 0.05$.

Abbreviations

The following abbreviations are used in the paper: CAS – California Academy of Sciences, San Francisco; IMB – Institute of Marine Biology, Russian Academy of Sciences, Vladivostok; MIMB – Museum of the Institute of Marine Biology, Vladivostok; NHM – The Natural History Museum, London; NMW – National Museums & Galleries of Wales, Cardiff; NSMT – National

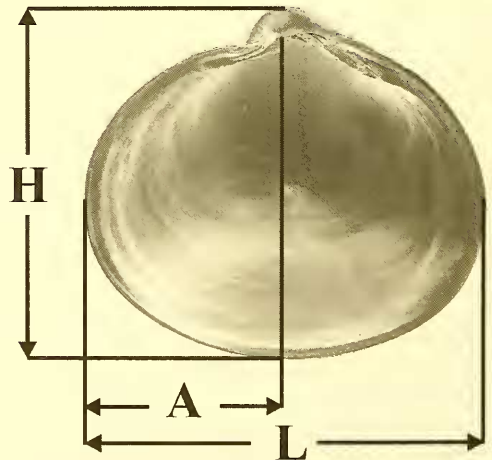


FIG. 1. Placement of shell measurements: L – shell length; H – height; A – anterior end length.

Science Museum, Tokyo; PRIFO – Pacific Research Institute of Fisheries and Oceanography, Vladivostok; UW – University of Washington, Seattle; ZIN – Zoological Institute, Russian Academy of Sciences, St.-Petersburg.

Type Material and Locality

Holotype (ZIN 9372), Commander Islands, Coll. E. F. Gurjanova, 1930 (Scarlato, 1981).

Material Examined

16 lots (MIMB 2989, 2990, 2992, 2994, 2996–3000, 3047–3050, 3052, 3053, 3055) from the tidal zone of Urup Island, Kuril Islands (15 specimens, 1 right, 5 left valves); 63 lots (MIMB 2993, 3001, 3002, 3052, 3054, 1MB) from the intertidal and tidal zones of the Commander Islands (131 specimens). Total of 146 specimens, 1 right, and 5 left valves.

SYSTEMATICS

Family Lasaeidae Gray, 1842
Genus *Kellia* Turton, 1822

Type species: *Mya suborbicularis* Montagu, 1803

Diagnosis

Shell small (< 30 mm), thin, ovate to globular, inflated, inequilateral, equivalve. Surface with growth lines. Periostracum thin, adherent, colorless, gray, green to yellow. Beaks prosogyrate, almost central. Hinge plate narrow. Right valve with one cardinal tooth and posterior lateral tooth; left valve with two cardinal teeth and posterior lateral tooth. Ligament internal, partly lodged in a lanceolate resilifer, situated between cardinal and lateral teeth. Pallial line without pallial sinus.

Kellia comandorica Scarlato, 1981
(Figs. 2–20, Table 1)

Kellia comandorica Scarlato, 1981: 321, pls. 284 (holotype), 285.

Kellia suborbicularis (Montagu, 1803), Coan et al., 2000: 323 (partim).

Description (expanded from that of Scarlato, 1981)

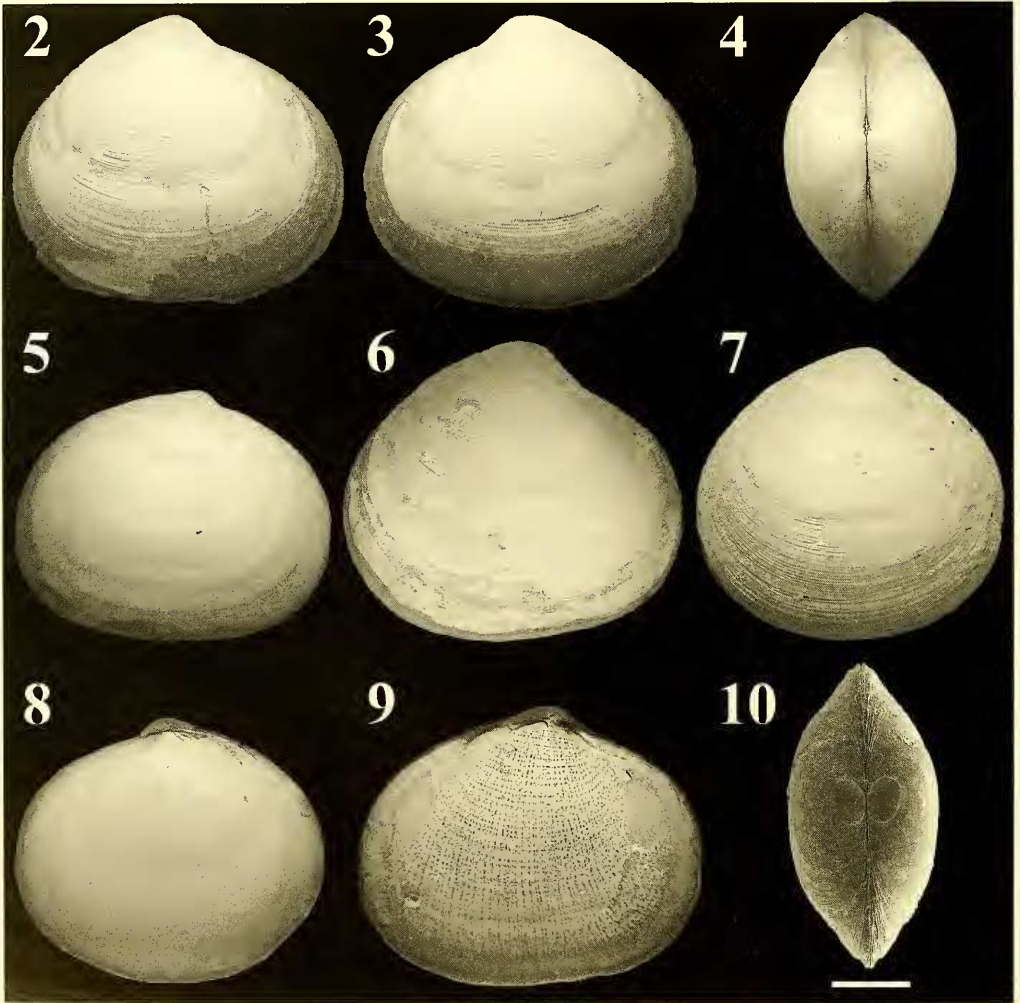
Exterior: Shell small (to 16.8 mm), ovate-angular, high (H/L = 0.735–0.976), equivalve, inflated (W/L of valve 0.198–0.397), inequilateral, thin, solid. Surface with conspicuous, often rather rough growth lines. Periostracum thin, adherent, non-polished, colorless or gray, extending into inner surface. Beaks small, moderately projecting above dorsal margin, slightly anterior to midline (sometimes central) (A/L = 0.314–0.5), rounded, prosogyrate. Anterior and posterior ends rounded. Anterodorsal margin slightly convex, gently descending ventrally, smoothly transitioning to slightly curved anterior margin. Ventral margin slightly curved. Posterodorsal margin slightly convex, rather steeply descending to rounded posterior margin.

TABLE 1. *Kellia comandorica* Scarlato, 1981. Summary statistics of the shell measurements (mm) and indices: L – shell length; A – anterior end length; H – height; W – width. Numerator indicates the summary statistics for the right valve, denominator – for the left valve.

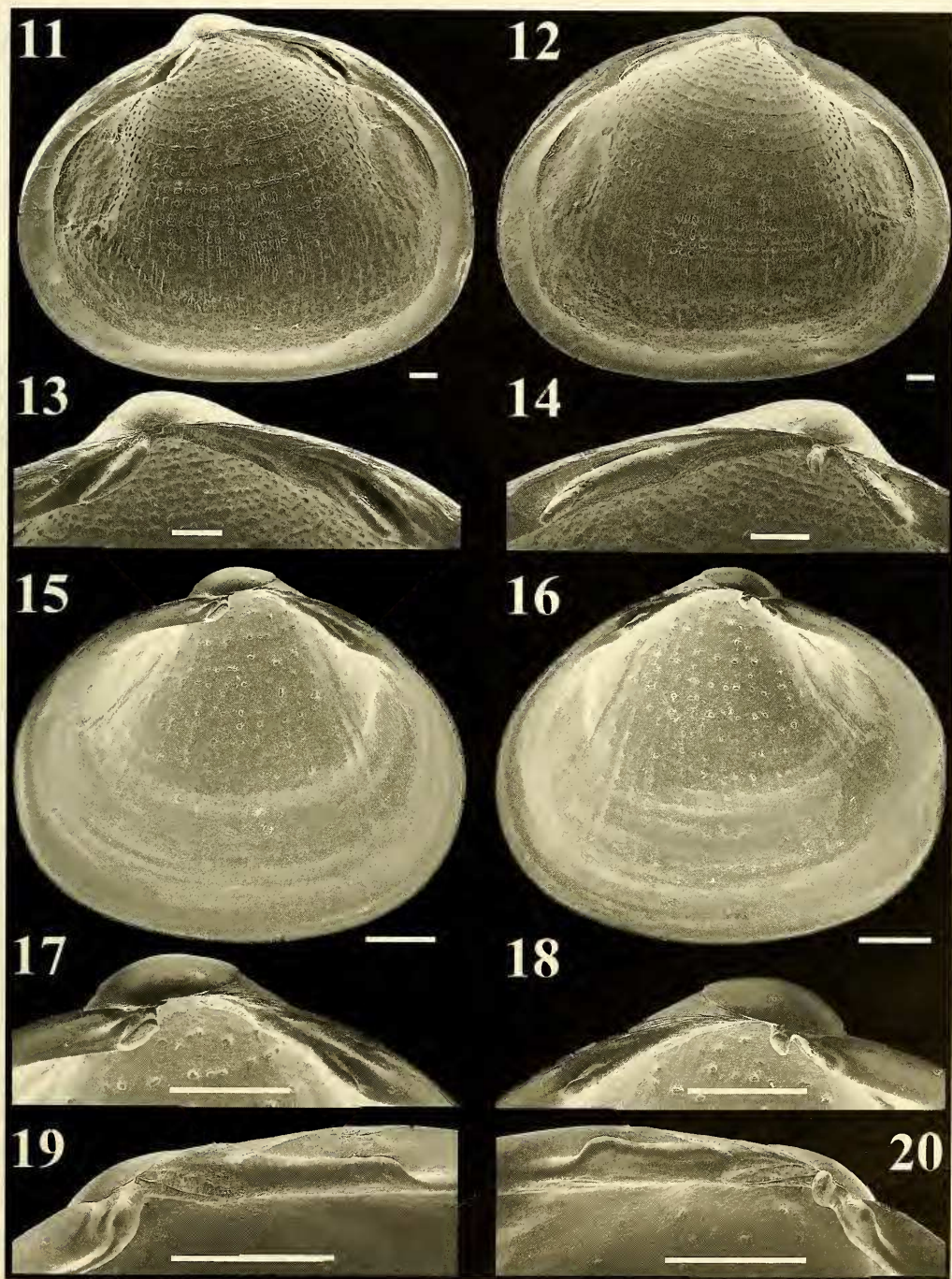
Statistics	L	A	H	W	A/L	H/L	W/L
Mean	9.31	4.26	7.91	2.47	0.458	0.846	0.264
	9.21	4.21	7.82	2.47	0.458	0.846	0.265
SD	0.33	0.15	0.29	0.10	0.003	0.005	0.003
	0.32	0.15	0.28	0.10	0.003	0.005	0.003
SE	3.04	1.41	2.72	0.92	0.027	0.049	0.031
	2.99	1.39	2.69	0.93	0.027	0.048	0.030
Min	3.4	1.6	2.5	0.9	0.314	0.735	0.198
	3.4	1.6	2.5	0.9	0.314	0.735	0.198
Max	16.8	7.8	15.2	5.1	0.500	0.976	0.389
	16.8	7.8	15.2	5.2	0.500	0.976	0.397
n	86	86	86	86	86	86	86
	90	90	90	90	90	90	90

Interior. Right valve with one cardinal tooth and posterior lateral tooth; left valve with two cardinal teeth and posterior lateral tooth. In right valve, cardinal tooth large, elongate, flattened, with a flat top, anteroventrally directed, situated at edge of inner part of anterodorsal shell margin; posterior lateral tooth large, long, extending along posterodorsal shell margin.

In left valve, anterior cardinal tooth large, elongate, flattened, often triangular, anteroventrally directed, situated at edge of inner part of anterodorsal shell margin; posterior cardinal tooth small, rounded, isolated, fingerlike, with rounded top, situated exactly under beak; posterior lateral tooth large, long, extending along posterodorsal shell margin. Internal ligament



FIGS. 2–10. *Kellia comandorica* Scarlato, 1981. 2–4: MIMB (3002), Gladky Cape, Medny Island, Commander Islands, intertidal zone, shell length 16.4 mm. 5: MIMB (2994), Lidina Cape, Urup Island, Kuril Islands, 20 m, shell length 16.0 mm. 6: Poludennaya Bight, Medny Island, Commander Islands, 20 m, shell length 11.8 mm. 7: Poludennaya Bight, Medny Island, Commander Islands, 20 m, shell length 13.1 mm. 8: Peschany Cape, Medny Island, Commander Islands, shell length 13.1 mm. 9: MIMB (2998), Van-der-Linda Cape, Urup Island, Kuril Islands, 10 m, shell length 14.7 mm. 10: Polovina Cape, Bering Island, Commander Islands, 5 m, dorsal view of both valves of a young specimen. Bar = 1 mm.



FIGS. 11–20. *Kellia comandorica* Scarlato, 1981. 11–14: Peschany Cape, Medny Island, Commander Islands, 15 m. 11, 12: Right and left valves of an adult specimen. 13, 14: Hinge of right and left valves. 15–20. Phedoskina Cape, Bering Island, Commander Islands, 5 m. 15, 16: Right and left valves of a young specimen. 17, 18: Hinge of right and left valves. 19, 20: Ventral view of hinge of right and left valves showing resilifer. Bar = 500 μ m.

well-developed, large, situated between cardinal and lateral teeth, posteriorly directed, partly lodged in lanceolate resilifer extending obliquely posterior to beaks. Anterior adductor muscle scar large, rounded; posterior muscle scar large, ovate-angular, longer and wider than anterior scar. Pallial line without pallial sinus. Shell interior with conspicuous radial rows of fossae extending to pallial line.

Variability

Shell shape and proportions, as well as width of the valves vary markedly (Table 1, Figs. 5–7). The shell shape varies from ovate-elongate with relatively small shell height to rounded with height almost equal to shell length. The shell is most often slightly angular but sometimes it is regularly ovate without angles. The specimens frequently have a deformed shell because of living in small holes and crevices of boulders and rocky platforms, preventing normal growth. The position of the beaks is also variable. Usu-

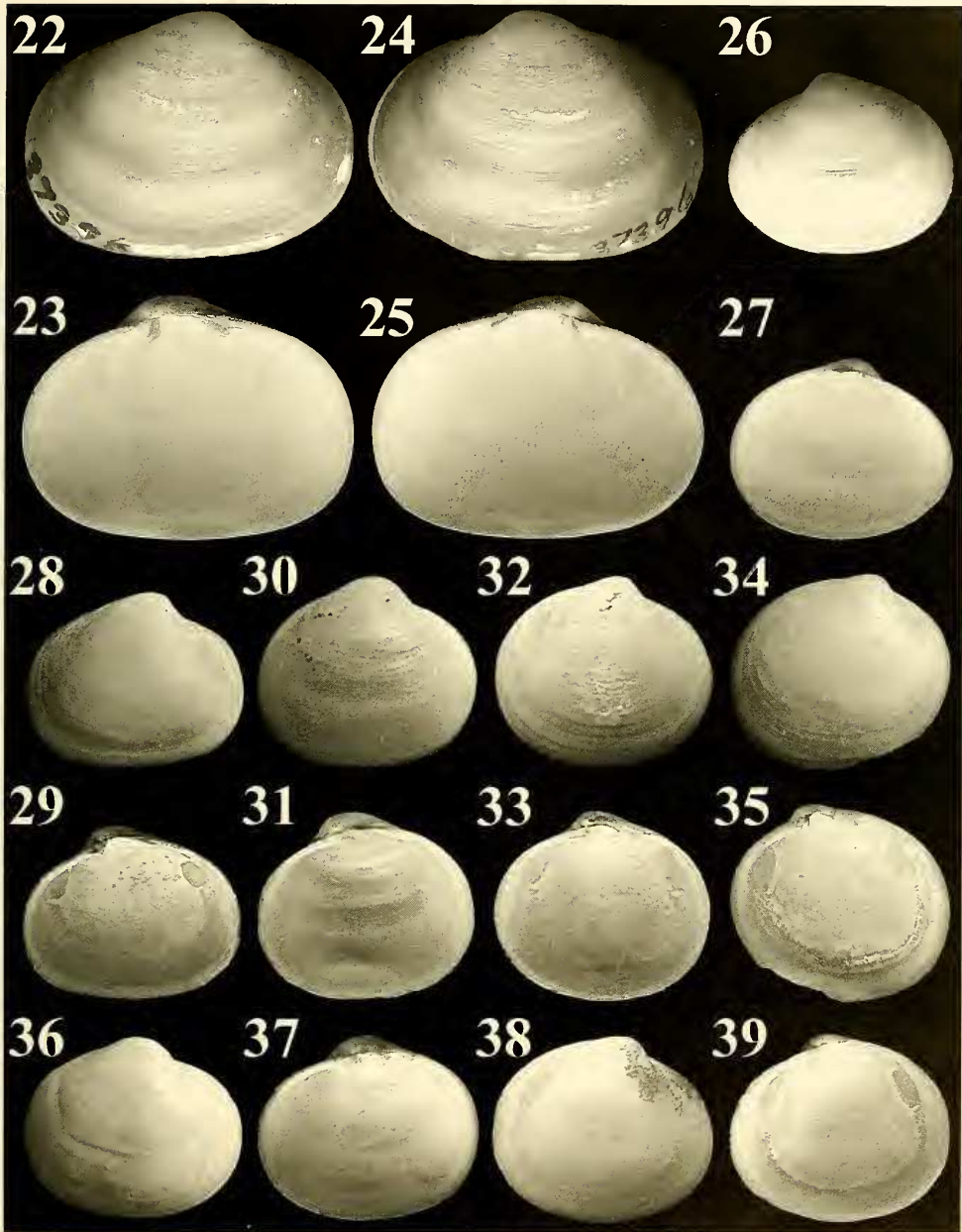
ally the beaks are anteriorly placed but sometimes they occupy the central position. The sizes and shape of cardinal and lateral teeth in both valves vary little. All investigated specimens, independent of the age, habitat, and geographic area, had conspicuous radial rows of fossae on the inner shell wall.

Distribution and Habitat (Fig. 21)

Kellia comandorica occurs near the Commander Islands and Urup Island (Kuril Islands). Near Bering Island and Medny Island (Commander Islands), *K. comandorica* is a common species of the bottom fauna. It was recorded from the intertidal zone to 20 m depth, on boulders and rocky platforms, at a bottom temperature from 4.0 to 10.2°C, with population density to 170 specimens/m². Near Urup Island (Kuril Islands) this species was found at depth from 5 to 20 m, on boulders and rocky platforms, with population density to 40 specimens/m².



FIG. 21. Distribution of *Kellia comandorica*, Scarlato 1981.



FIGS. 22–39. Shells of *Kellia* species. 22–27. *Kellia suborbicularis* (Montagu, 1803) from the north-eastern Pacific. 22–25: CAS (161254), Monterey Bay, California, 18–22 m, shell length 26.1 mm. 26–27: CAS (161255), Alaska, left valve, shell length 13.8 mm. 28–33. *Kellia suborbicularis* (Montagu, 1803) from the North Atlantic. 28–29: NMW (1953.183), Tenby, Pembrokeshire, Sea area 21, United Kingdom, right valve, shell length 11.7 mm. 30–31: NHM (20030382), Plymouth, United Kingdom, right valve, shell length 9.0 mm. 32–33: CAS (165845), England, right valve, shell length 8.9 mm. 34–35: *Kellia japonica* Pilsbry, 1895, NSMT (Mo 73530), Nagashima, Mie Prefecture, Japan, right valve, shell length 11.5 mm. 36–37: *Kellia subrotundata* (Dunker, 1882), NSMT (Mo 73532), Nosappu Cape, Hokkaido, Japan, right valve, shell length 11.4 mm. 38–39: *Kellia porculus* Pilsbry, 1904, NSMT (Mo 73531), Ushimado, Okayama Prefecture, Seto Inland Sea, Japan, right valve, shell length 8.3 mm.

TABLE 2. Differentiating characters of *Kellia* species. L – shell length; H – height; W – valve width; A – anterior end length.

Characters	<i>K. suborbicularis</i> (United Kingdom)	<i>K. suborbicularis</i> (NE Pacific)	<i>K. comandorica</i>	<i>K. kussakini</i>	<i>K. japonica</i>	<i>K. porculus</i>	<i>K. subrotundata</i>
Shell	solid	solid	solid	fragile, translucent	solid	solid	solid
Shell shape (H/L)	ovate-angular (0.857)	ovate-elongate (0.809)	ovate-angular (0.846)	pear-shaped, globular (0.950)	rounded quadrate (0.878)	subspherical (0.880)	ovate-subquadrate (0.842)
Shell max. length, mm	11.7	26.1	16.8	4.8	11.5	13.0	11.4
Valve (W/L)	very inflated (0.304)	inflated (0.260)	inflated (0.264)	very inflated (0.340)	very inflated (0.304)	inflated (0.289)	very inflated (0.330)
Beaks (A/L)	low, slightly anterior to midline (0.443)	low, anterior to midline (0.414)	low, slightly anterior to midline (0.458)	high, slightly posterior to midline (0.517)	low, strongly anterior to midline (0.261)	high, anterior to midline (0.386)	high, swollen, slightly anterior to midline (0.439)
Periostracum	slightly polished, yellowish-gray	polished, yellow or grayish-yellow	non-polished, colorless or gray	slightly polished, yellowish-gray	polished, yellow	polished, yellow or grayish-yellow	polished, yellow
Shell surface	with faint or conspicuous growth lines	with faint growth lines	with conspicuous, rough growth lines	with faint growth lines	with faint growth lines	with faint growth lines	with faint growth lines
Internal shell surface	sometimes with faint radial striae	sometimes with faint radial striae	with conspicuous radial rows of fossae	smooth	sometimes with faint radial striae	sometimes with faint radial striae	sometimes with faint radial striae

TABLE 4. Results of comparison by pairs of mean values (Student (T) test) and variances (ANOVA) of indices of the right and left valves of *Kellia comandorica*, *K. kussakini*, and *K. suborbicularis*: L - shell length; A - anterior end length; H - height; W - width; P - probability that index values in *K. comandorica*, *K. kussakini*, and *K. suborbicularis* are drawn from the same population; n - number of valves of compared species, respectively; * - significant difference.

Indices	Right valves					Left valves				
	T	P	F	P	n	T	P	F	P	n
<i>K. comandorica</i> and <i>K. suborbicularis</i> (North Atlantic)										
A/L*	-2.60	0.006	7.66	0.006	86/44	-2.73	0.004	8.75	0.004	90/44
H/L	1.45	0.080	1.77	0.187	86/44	1.44	0.008	1.76	0.187	90/44
W/L*	6.24	< 0.001	42.69	< 0.001	86/44	6.23	< 0.001	43.38	< 0.001	90/44
<i>K. comandorica</i> and <i>K. suborbicularis</i> (Northeastern Pacific)										
A/L*	8.23	< 0.001	48.43	< 0.001	86/21	8.43	< 0.001	51.50	< 0.001	90/21
H/L*	3.78	< 0.001	10.62	0.002	86/21	3.87	< 0.001	11.24	0.001	90/21
W/L	0.83	0.205	0.47	0.492	86/21	0.87	0.196	0.49	0.486	90/21
<i>K. kussakini</i> and <i>K. comandorica</i>										
A/L*	13.46	< 0.001	178.21	< 0.001	86/97	13.59	< 0.001	179.79	< 0.001	86/97
H/L*	11.02	< 0.001	125.47	< 0.001	86/97	11.25	< 0.001	128.38	< 0.001	86/97
W/L*	15.99	< 0.001	252.99	< 0.001	86/97	16.04	< 0.001	253.16	< 0.001	86/97
<i>K. kussakini</i> and <i>K. suborbicularis</i> (North Atlantic)										
A/L*	-12.39	< 0.001	160.41	< 0.001	97/44	-12.26	< 0.001	159.50	< 0.001	97/44
H/L*	-8.88	< 0.001	76.69	< 0.001	97/44	-8.85	< 0.001	79.36	< 0.001	97/44
W/L*	-5.79	< 0.001	35.06	< 0.001	97/44	-5.65	< 0.001	33.44	< 0.001	97/44
<i>K. kussakini</i> and <i>K. suborbicularis</i> (Northeastern Pacific)										
A/L*	18.60	< 0.001	205.68	< 0.001	97/21	18.60	< 0.001	205.68	< 0.001	97/21
H/L*	11.88	< 0.001	147.89	< 0.001	97/21	11.89	< 0.001	148.39	< 0.001	97/21
W/L*	13.55	< 0.001	111.36	< 0.001	97/21	13.80	< 0.001	109.01	< 0.001	97/21
<i>K. suborbicularis</i> (North Atlantic) and <i>K. suborbicularis</i> (Northeastern Pacific)										
A/L*	4.34	< 0.001	13.74	< 0.001	44/21	4.24	< 0.001	12.95	< 0.001	44/21
H/L*	4.82	< 0.001	23.61	< 0.001	44/21	4.84	< 0.001	23.76	< 0.001	44/21
W/L*	6.09	< 0.001	27.30	< 0.001	44/21	6.16	< 0.001	27.03	< 0.001	44/21

Most specimens of *K. suborbicularis* from the northeastern Pacific had a ovate-elongate, markedly less inflated shell, reaching more than 26 mm in length, with more anteriorly placed beaks and yellow, strongly polished periostracum (Figs. 22–27, Table 5). The specimens with an analogous shell shape (more 20 mm in length) were also recorded off the Kuril Islands (materials from the expedition with the R/V "Akademik Oparin", 1 July – 4 August 2003). All these morphological characteristics are observed in *Kellia laperousii* (Deshayes, 1839) (Oldroyd, 1925; Scarlato, 1981), which Coan et al. (2000) also considered to be a synonym of *K. suborbicularis*. They stated that no consistent difference from the North Atlantic *K. suborbicularis* can be found when similar-sized specimens are com-

pared. However, a detailed study of this question is needed. Taking into account the results of comparison of specimens of *K. suborbicularis* from the North Atlantic and the northeastern Pacific, I think that most likely a separate species *K. laperousii* occurs in the North Pacific.

The species of the genus *Kellia* – *K. japonica*, *K. porculus* and *K. subrotundata* – living off the coast of Japan (Okutani, 2000), are most similar to *K. suborbicularis* in shape and shell proportions (Tables 2, 3, Figs. 28–39). In addition, the species from Japan are also very similar to each other. Some differences between these species exist in the degree of inflation of the shell, the position and form of the beaks, and the color of the periostracum (Table 2). However, the differ-

TABLE 5. *Kellia suborbicularis* (Montagu, 1803) from the northeastern Pacific (CAS 1612564, 161255, 161256). Summary statistics of the shell measurements (mm) and indices: L – shell length; A – anterior end length; H – height; W – width. Numerator indicates the summary statistics for the right valve, denominator – for the left valve.

Statistics	L	A	H	W	A/L	H/L	W/L
Mean	<u>15.56</u> 15.56	<u>6.40</u> 6.40	<u>12.55</u> 12.55	<u>4.06</u> 4.08	<u>0.414</u> 0.414	<u>0.809</u> 0.809	<u>0.259</u> 0.260
SD	<u>0.97</u> 0.97	<u>0.37</u> 0.37	<u>0.75</u> 0.75	<u>0.30</u> 0.30	<u>0.004</u> 0.004	<u>0.008</u> 0.008	<u>0.005</u> 0.005
SE	<u>4.47</u> 4.47	<u>1.70</u> 1.70	<u>3.44</u> 3.44	<u>1.36</u> 1.37	<u>0.020</u> 0.020	<u>0.038</u> 0.038	<u>0.023</u> 0.021
Min	<u>9.4</u> 9.4	<u>4.2</u> 4.2	<u>7.3</u> 7.3	<u>2.0</u> 2.0	<u>0.380</u> 0.380	<u>0.743</u> 0.743	<u>0.213</u> 0.213
Max	<u>26.1</u> 26.1	<u>10.4</u> 10.4	<u>19.4</u> 19.4	<u>8.2</u> 8.2	<u>0.463</u> 0.463	<u>0.873</u> 0.873	<u>0.314</u> 0.314
n	<u>21</u> 21	<u>21</u> 21	<u>21</u> 21	<u>21</u> 21	<u>21</u> 21	<u>21</u> 21	<u>21</u> 21

ence in shell proportions can be attributed to the individual variability of one species. Because only a very limited material on *Kellia* species from Japan was at my disposal, no final conclusion can be made. It is not improbable that after a detailed study of more extensive material, these species prove to be a synonym of one species different from *K. suborbicularis* or *K. laperosusii*.

Kellia kussakini Kamenev, new species

Figs. 40–53, Table 6

Type Material and Locality

Holotype (MIMB 7770), Phedoskina Cape, Bering Island, Commander Islands, Pacific Ocean, 5 m, rocky platform, bottom water temperature of 10.0°C, Coll. V. I. Lukin, 23-IX-1973 (RV "Rakitnoye"); paratypes (96) (MIMB 7771) from holotype locality.

Other Material Examined

38 specimens with slightly damaged shells from type locality; 1 specimen from Najushka Bight, Bering Island, Commander Islands, Pacific Ocean, 20 m, rocky platform, bottom water temperature of 9.8°C, Coll. G. T. Belokonev, 24-IX-1973 (RV "Rakitnoye"); 1 specimen from Nerpichy Cape, Bering Island, Commander Islands, Pacific Ocean, 10 m, rocky platform, bottom water temperature of 7.4°C, Coll. V. I. Lukin, 21-VII-1972 (the sealer "Krylatka"); 2 specimens from Peschany Cape,

Medny Island, Commander Island, Bering Sea, 10 m, boulders, bottom water temperature of 5.0°C, Coll. V. P. Kashenko, 10-VII-1972 (the sealer "Krylatka"); 5 specimens from Poludennaya Bight, Medny Island, Commander Island, Pacific Ocean, 15 m, rocky platform, bottom water temperature of 4.2°C, Coll. V. I. Lukin, 17-VII-1972 (the sealer "Krylatka"); 1 right valve from Vodopadsky Cape, Medny Island, Commander Islands, Pacific Ocean, 20 m, rocky platform, bottom water temperature of 7.6°C, Coll. G. T. Belokonev, 11-IX-1973 (RV "Rakitnoye"). Total of 47 specimens and 1 right valve.

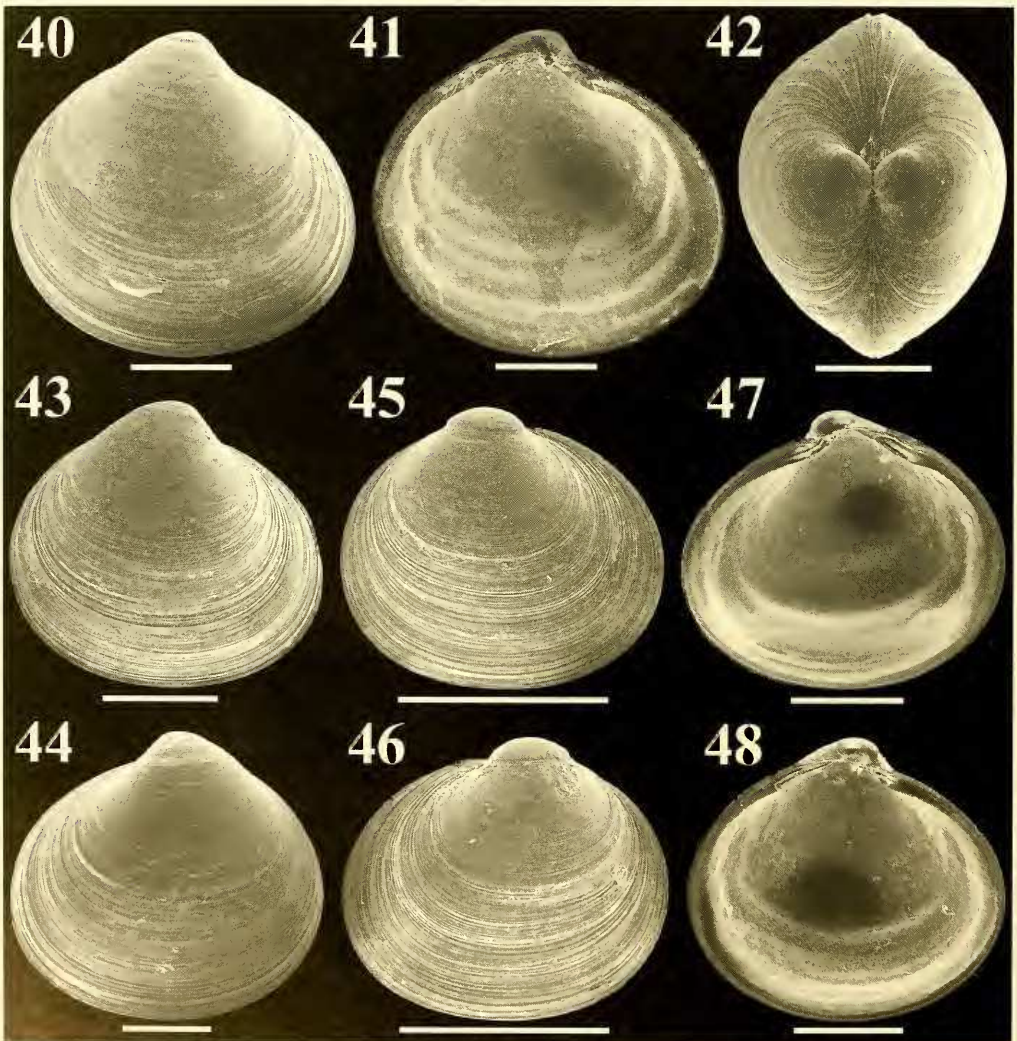
Description

Exterior. Shell very small (to 4.8 mm), pear-shaped, with slightly narrowing anterior end, almost globular, very high (H/L = 0.833–1.036, shell height almost equal to or sometimes greater than length), equivalve, very inflated (W/L of valve = 0.278–0.429, shell width almost equal to length), inequilateral, thin, fragile, translucent. Surface with faint growth lines. Periostracum thin, adherent, slightly polished, yellowish-gray, extending into inner surface. Beaks small, high, strongly projecting above dorsal margin, slightly posterior, sometimes central or slightly anterior (A/L = 0.371–0.579), rounded, prosogyrate. Anterior end slightly narrowed, rounded, lower than posterior shell end. Posterior end rounded. Anterodorsal margin slightly convex, rather steeply descending ventrally, smoothly transitioning to

strongly curved anterior margin. Ventral margin strongly curved. Posterodorsal margin slightly convex, steeply descending ventrally, smoothly transitioning to curved posterior margin.

Interior: Right valve with one cardinal tooth and posterior lateral tooth; left valve with two cardinal teeth and posterior lateral tooth. In right valve, cardinal tooth large, elongate, flattened, with rounded or flat top, anteroventrally

directed, situated at edge of inner part of anterodorsal shell margin; posterior lateral tooth large, long, extending along posterodorsal margin. In left valve, anterior cardinal tooth larger, than posterior, elongate, flattened, with rounded top, anteroventrally directed, situated at edge of inner part of anterodorsal shell margin; posterior cardinal tooth smaller, rounded, isolated, fingerlike, with rounded top, situated exactly under beak; posterior lateral tooth large, long, ex-



FIGS. 40–48. *Kellia kussakini* Kamenev, new species. 40, 41: Holotype (MIMB 7770), Phedoskina Cape, Bering Island, Commander Islands, Pacific Ocean, 5 m. 42–48: Paratypes (MIMB 7771) from holotype locality. 42: Dorsal view of both valves. 43, 44: Right and left valves of an adult specimen. 45, 46: Right and left valves of a young specimen. 47, 48: Right and left valves without ligament. Bar = 1 mm.

tending along posterodorsal shell margin. Internal ligament well developed, large, situated between cardinal and lateral teeth, posteriorly directed, partly lodged in lanceolate resilifer extending obliquely posterior to beaks. Anterior adductor muscle scar large, rounded; posterior muscle scar large, ovate-angular, longer and wider than anterior scar. Pallial line without pallial sinus. Shell interior smooth, without radial rows of fossae or striae.

Variability

Shell shape and proportions change little with age. In young specimens (< 2.5 mm), the shell is less high, less inflated, and beaks are more posteriorly placed. In adults, shell height and width, the position of beaks vary slightly (Table 6, Figs. 43–46). As a whole, shell remains pear-shaped, with more narrow anterior end, and almost globular because of almost absolute equality of the length, height, and width. The beaks are mostly

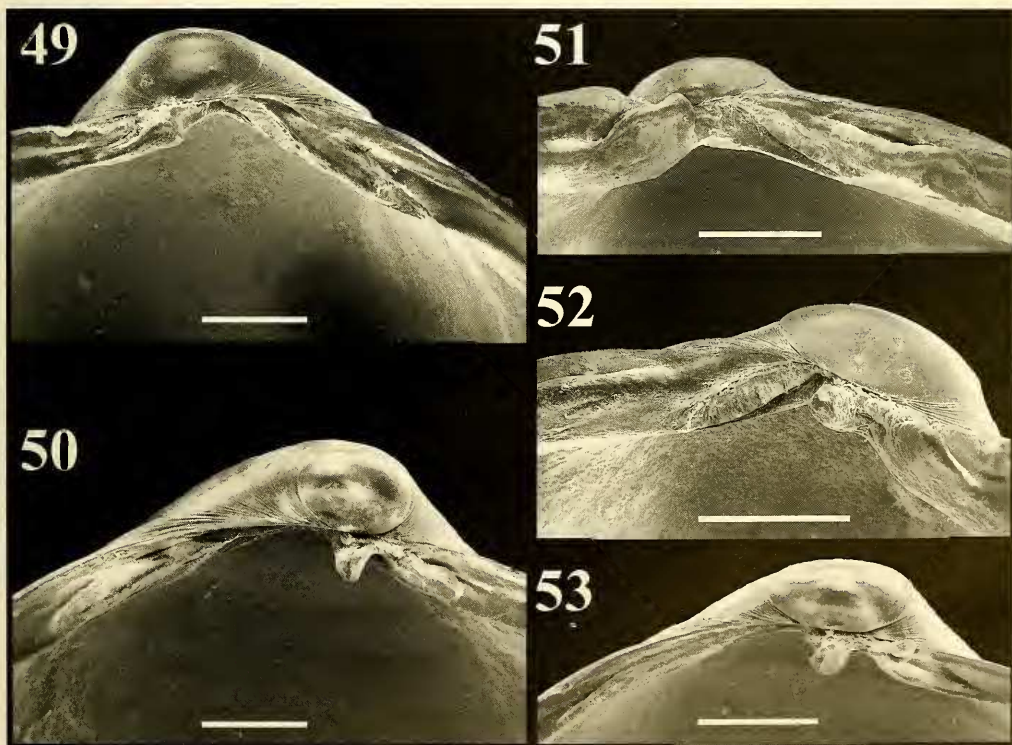
posteriorly placed (the beaks of 8 out of 97 measured specimens are anteriorly placed). The sizes and shape of cardinal and lateral teeth in both valves vary little. A few specimens had three cardinal teeth in the left valve (Fig. 53).

Distribution and Habitat (Fig. 54)

This species was recorded near Bering and Medny islands, Commander Islands, at a depth from 5 to 20 m, on boulders and rocky platforms, at a bottom water temperature from 4.2°C to 10.0°C, with population density to 1,190 specimens/m² (type locality).

Comparisons

This species is easily distinguished from other species of this genus by its small, almost globular, very high, and inflated shell with posteriorly placed high beaks (Table 2). Mean values and variances of the indices characterizing the position of beaks (A/L), the rela-



FIGS. 49–53. *Kellia kussakini* Kamenev, new species, paratypes (MIMB 7771) from holotype locality. 49, 50: Hinge of right and left valves. 51, 52: Ventral view of hinge of right and left valves showing resilifer. 53: Hinge of left valves with three cardinal teeth. Bar = 300µm.

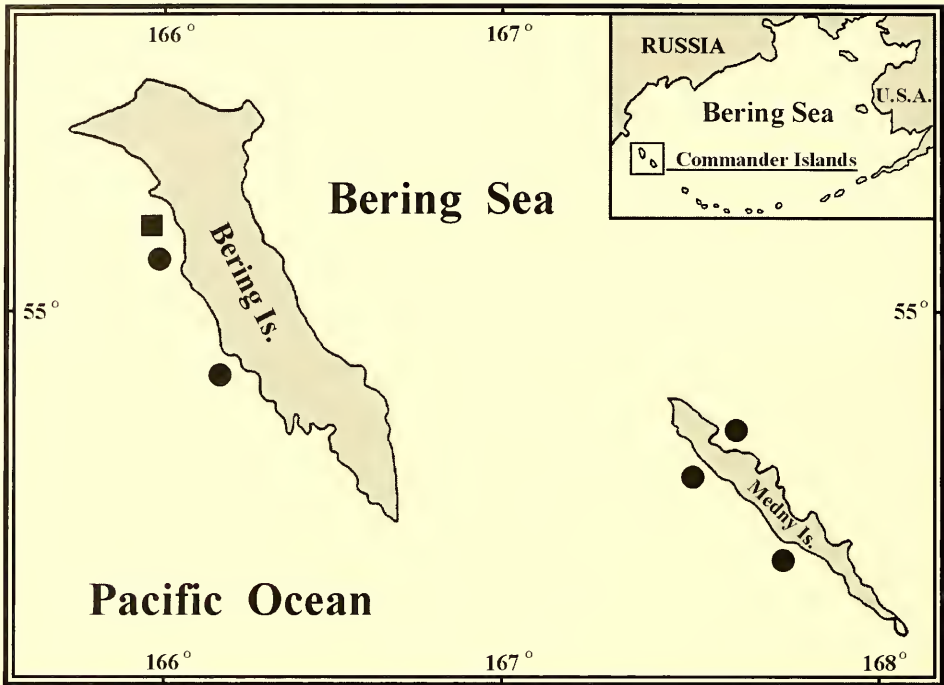


FIG. 54. Distribution of *Kellia kussakini* (■ – type locality).

TABLE 6. *Kellia kussakini* Kamenev, new species. Shell measurements (mm), indices of holotype (MIMB 7770), and summary statistics of holotype and paratypes (MIMB 7771) characters: L – shell length; A – anterior end length; H – height; W – width. Numerator indicates shell measurements, indices, and summary statistics for the right valve, denominator – for the left valve.

Statistics	L	A	H	W	A/L	H/L	W/L
	Holotype						
	<u>4.0</u>	<u>2.1</u>	<u>3.8</u>	<u>1.4</u>	<u>0.525</u>	<u>0.950</u>	<u>0.350</u>
	4.0	2.1	3.8	1.4	0.525	0.950	0.350
	Holotype and paratypes						
Mean	<u>2.95</u>	<u>1.52</u>	<u>2.71</u>	<u>1.01</u>	<u>0.517</u>	<u>0.917</u>	<u>0.340</u>
	2.95	1.52	2.71	1.01	0.517	0.917	0.340
D	<u>0.06</u>	<u>0.03</u>	<u>0.06</u>	<u>0.03</u>	<u>0.003</u>	<u>0.004</u>	<u>0.003</u>
	0.06	0.03	0.06	0.03	0.003	0.004	0.003
SE	<u>0.60</u>	<u>0.29</u>	<u>0.59</u>	<u>0.27</u>	<u>0.027</u>	<u>0.037</u>	<u>0.034</u>
	0.60	0.29	0.59	0.27	0.027	0.037	0.034
Min	<u>1.4</u>	<u>0.8</u>	<u>1.2</u>	<u>0.4</u>	<u>0.444</u>	<u>0.833</u>	<u>0.278</u>
	1.4	0.8	1.2	0.4	0.444	0.833	0.278
Max	<u>4.8</u>	<u>2.6</u>	<u>4.6</u>	<u>1.8</u>	<u>0.579</u>	<u>1.036</u>	<u>0.429</u>
	4.8	2.6	4.6	1.8	0.579	1.036	0.429
n	<u>97</u>	<u>97</u>	<u>97</u>	<u>97</u>	<u>97</u>	<u>97</u>	<u>97</u>
	97	97	97	97	97	97	97

tive height (H/L) and width (W/L) in *K. kussakini* were significantly different from the mean values and variances of the same indices of *K. comandorica* and *K. suborbicularis* (Table 4). Besides, unlike *K. comandorica*, it has a smooth interior shell wall without the radial rows of fossae.

In shell shape, *K. kussakini* is close to *K. porculus* (Figs. 38, 39), living off the coast of Japan, from which it is distinguished in having a more high, very inflated, fragile and translucent shell with posteriorly placed beaks and a slightly polished, yellowish-gray periostracum (Table 2).

Etymology

The specific name honors Oleg G. Kussakin, Academician of the Russian Academy of Sciences, a famous Russian researcher of the marine fauna of the intertidal zone of Russian Pacific seas and world isopod fauna, who devoted all his life to the study of the northwestern Pacific fauna.

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